

UNITED STATES DEPARTMENT OF AGRICULTURE

BUREAU OF ENTOMOLOGY

FOREST INSECT INVESTIGATIONS

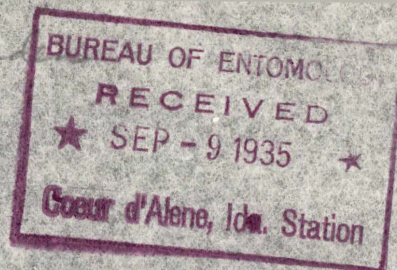
LODGEPOLE NEEDLE MINER DEMONSTRATION  
AND EXPERIMENTAL CONTROL PROJECT

Period of July 31 through August 15, 1935

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## REPORT

LOGSPOLE WINTER WILDER DEMONSTRATION AND EXPERIMENTAL CONTROL PROJECT  
Period of July 31 through August 15, 1935

### DEMONSTRATION CONTROL

#### COVERAGE

It has been found that, with 100 feet of 3/4 inch hose and 500 pounds pressure at the pump, practically complete coverage of the largest trees can be secured. This pump pressure yields 395 pounds pressure at the tip of a 1/4 inch nozzle on the Northley gun. Use of the quick breaking emulsion formed by the blood albumin spreader appears to give a much better coverage and spreading of the oil on the needles than was secured with other spreaders and tighter emulsions in previous experimental work.

#### EQUIPMENT

The fact that pressures sufficient to throw a 100 foot stream with 200 feet of 3/4 inch hose could not be secured with the equipment as it was adjusted, limited its use to trees that could be approached to within about 50 feet by the truck. Although pressures greater than those that have been used are in the company specifications for the equipment, a pressure of 600 pounds ruptured the by-pass diaphragm after one day of work at varying pressures during tests of nozzle equipment. Two more diaphragms have been ruptured at pressures of 575 pounds (nozzle closed), which gives 500 pounds pressure when a 1/4 inch nozzle is in use. Adjustments of the by-pass have been made, which it is hoped will correct the difficulty. It seems advisable that a factory representative examine the machine if more trouble is encountered.

Since efficient and satisfactory operation of equipment of this type under the conditions of the work is dependant on the suitable character of a multitude of details in construction of motor, pump, hose and couplings, gun and nozzles, it is recommended that study be made of the requirements of the work. The physical difficulties of application do not appear insurmountable if equipment is of a suitable size and construction. If the control secured by oil emulsions is satisfactory, it is certain that more extensive control projects will be necessary. Future heavy infestations in areas of increasing use will require other spraying units. It is advisable, therefore, that a study of the present operation from an engineer's standpoint be made and information concerning equipment needs secured in anticipation of future requirements.



### CONSUMPTION OF MATERIALS

It was anticipated that cost of materials alone would limit control by oil sprays to areas of greatest value. It is gratifying to report that applications on two plots, totalling 8.607 acres in area, have resulted in a cost of materials of less than \$10.00 per acre. However, both plots have stands of less than average density and average height. The variations in the factors of stand density and tree height will result in marked variations in cost of application.

### EXPERIMENTAL CONTROL

### CONTROL RESULTS

Sprays applied against the pupal stage showed only fair control in the case of some of the materials used. Picotene sulphate appeared to be associated with successful pupation but unsuccessful emergence from the needles. The relative efficiency of each spray, taking into consideration the cost of materials per 500 gallon tank, is given in the following table, which also includes per cent of mortality, parasitism and unsuccessful emergence. It is interesting to note the cheapest spray, although not giving the highest mortality and the best control, killed the greatest number of needleminers per dollar spent for materials.

2003

Test. No.	24	25	26	27	28	29	30	31	Check
Materials and rates	LO	LO	LO	LO	LO	LO	LO	LO	
	3%	4%	5%	4%	3%	1%	1%	4%	
	AC	LS	LS	BL40	BL40	BL40	AC	BA	
		4%	5%	1%	3%	3%			
	AC	AC	AC	AC	AC				
Date of application	7/5	7/8	7/8	7/8	7/8	7/8	7/8	7/13	
Individuals in test	199	233	304	95	105	92	98	95	800
Mortality % from Parasites	1.0	0.38	1.32	0.0	3.71	2.17	2.04	6.31	6.00%
Mortality % Control	29.7	6.3	13.7	61.0	43.7	44.5	61.2	40.0	8.00%
Per Cent Unsuccessful Emergence	4.5	0.5	4.5	42.1	29.5	39.5	17.3	5.3	3.0



#### Materials

Cost / or

500 gals(0) 11.83: 10.03: 10.98: 46.03: 28.88: 28.25: 17.83: 6.01:

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Cost effi-

ciency index : 85 : 6 : 17 : 13 : 15 : 15 : 34 : 66:

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#### Materials:

LQ - Ortho Light oil /1

AC - Ammonium caseinate spreader according to Newcover's Formula

LS - Liquid lime sulfur

BL40 - Nicotine sulfate 40%, or Black Leaf 40

PS - Sulstrex sulphate - & pine oil

70 - Medium oil 70% unsulphonation called 70 Pale (Assoc. Oil Co.)

BI - Blood albumin spreader 4 oz. to 100 gallons of water.

The results secured by the 70 Pale oil indicate the possibilities of control that may lie in the winter oil group having a low unsulphonation. It is apparent lodgepole pine can withstand cruder oils than many cultivated crops. This resistance will be investigated this season, and control tests using the cruder oils should be a part of future investigation.

Two series of nine ovicidal sprays have been applied to experimental trees. Counts to determine the control exerted by these applications will be made later in the season.

#### PARASITES

Five, or possibly six, different species of insects that may be parasites and which may work to the detriment of the needleminer have been reared from material collected in the Porcupine Flat Infestation area. Parasitism appears to be less than 6% this season. All parasites are being saved for identification. Attempts are being made to keep those collected alive for attempts at parasitism of other hosts. This will be done in order to determine their roles in reducing the needleminer population and test the possibilities of use of parasites in control.

#### FLIGHT AND MIGRATION

Fourteen stations along the Pioga Road from Porcupine Creek east to Tullame Meadows have been utilized as areas for collection and observation of the population in flight.

In general it has been found sweeping methods are of value only in heavy infestations. Disturbance of the foliage at about 15 feet above the ground and observation of the number of moths dislodged has been utilized in determining the relative density of the population in flight.



Flight reached a peak about August 5. The flight during the entire period of observation was light on the east slope of the Yosemite Creek basin and, except for a small area of about four acres, was light west of Porcupine Creek. In creek bottoms and protected areas the flight was progressively heavier east of Porcupine Creek, reaching a peak in the Porcupine Flat area. Up to August 6 flight was light at Snow Creek, Tenaya Lake, Cathedral Creek and Tuolumne Meadows. After that date, however, there was a marked increase in flight at Snow Creek, Tenaya and Cathedral Creek. It is believed this increase was due to migration from the more heavily infested Porcupine Flat, lower Snow Creek and Forsyth Pass areas. In no area has flight been as heavy as has been described by observers during the peak of past epidemics. Therefore, it may be concluded that the infestation has not reached its peak in any area along the Tioga Road. However, reports by National Park Service personnel indicate peak infestations and flights occurred in some of the more remote areas of the park in which spray control is not feasible.

#### DEVELOPMENT OF 1935 BROOD

Observations of flight of moths indicate infestations in several areas of intensive use will be markedly heavier during the coming biennium than during the last.

Due to the time consuming nature of the observations, little work has been done in following the development of the eggs. Some 1600 needles have been examined since August 5 in an attempt to follow the hatching of eggs and beginning of mining activities of the larvae. Only one mine has been found in these needles. However, numerous punctures and lesions that may be the result of the first mining activities of the larvae have been found. No larvae have been observed in these lesions. Further development will have to take place before needle counts will be an index of infestation by the 1935 brood.

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Porcupine Flat  
Yosemite National Park  
August 17, 1935.